

1. A method of gate current characterization of a MOSFET wherein said MOSFET includes a gate electrode deposited over a gate dielectric layer on a substrate and source and drain regions associated with said gate electrode
5 comprising:

measuring device current at a plurality of terminals simultaneously wherein one of said terminals is a drain terminal;

evaluating a portion of said device current
10 measured at said drain terminal that is contributed by gate current;

subtracting said evaluated gate current contribution from said device current measured at said drain terminal to obtain pure drain current;

15 performing fitting procedures to obtain curves for said device currents; and

using said pure drain current to extract mobility model parameters wherein said gate current of said MOSFET is characterized using said extracted mobility
20 model parameters.

2. The method according to Claim 1 wherein there are four terminals.

3. The method according to Claim 2 wherein said four terminals comprise said drain terminal, a source terminal, a gate terminal, and a substrate terminal.

4. The method according to Claim 1 wherein said step of evaluating a portion of said device current measured at said drain terminal that is contributed by gate current comprises:

following a direct tunneling current model, approximating said gate current by the applied external voltage; and

partitioning said gate current so that current conservation is achieved.

5. The method according to Claim 1 wherein said gate current is approximately equal to said pure drain current.

6. A method of gate current characterization of a MOSFET wherein said MOSFET includes a gate electrode deposited over a gate dielectric layer on a substrate and source and drain regions associated with said gate electrode
5 comprising:

measuring device current at four terminals simultaneously wherein said terminals comprise a drain

terminal, a source terminal, a gate terminal, and a substrate terminal;

10 evaluating a portion of said device current measured at said drain terminal that is contributed by gate current;

 subtracting said evaluated gate current contribution from said device current measured at said
15 drain terminal to obtain pure drain current;

 performing fitting procedures to obtain curves for said device currents; and

 using said pure drain current to extract mobility model parameters wherein said gate current of said
20 MOSFET is characterized using said extracted mobility model parameters.

7. The method according to Claim 6 wherein said step of evaluating a portion of said device current measured at said drain terminal that is contributed by gate current comprises:

 following a direct tunneling current model, approximating said gate current by the applied external voltage; and

 partitioning said gate current so that current conservation is achieved.

8. The method according to Claim 6 wherein said gate current is approximately equal to said pure drain current.

9. A method of gate current characterization of a MOSFET wherein said MOSFET includes a gate electrode deposited over a gate dielectric layer on a substrate and source and drain regions associated with said gate electrode
5 comprising:

measuring device current at four terminals simultaneously wherein said terminals comprise a drain terminal, a source terminal, a gate terminal, and a substrate terminal;

10 evaluating a portion of said device current measured at said drain terminal that is contributed by gate current wherein said evaluating comprises:

following a direct tunneling current model, approximating said gate current by the applied external
15 voltage; and

partitioning said gate current so that current conservation is achieved;

subtracting said evaluated gate current contribution from said device current measured at said
20 drain terminal to obtain pure drain current;

performing fitting procedures to obtain curves for

said device currents; and

using said pure drain current to extract mobility
model parameters wherein said gate current of said
25 MOSFET is characterized using said extracted mobility
model parameters.

10. The method according to Claim 9 wherein said gate
current is approximately equal to said pure drain
current.